Toward a Complete Phyloreferencing Language

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Standard Definitional Forms

Node-Based Clade

Dinosauria is the final common ancestor of *Iguanodon* and *Megalosaurus*, and all descendants thereof.

Branch-Based Clade

Ornithischia is the initial ancestor of *Iguanodon* which is not also ancestral to *Megalosaurus*, and all descendants thereof.

Apomorphy-Based Clade

Avialae is the initial ancestor of *Vultur* to possess wings used for powered flight synapomorphic with those in *Vultur*, and all descendants thereof.

Exotic Definitional Forms

Ancestor-Based Clade

Panbiota is the initial ancestor of *Homo sapiens*, and all descendants thereof.

Apomorphy-Qualified Node-Based Clade

Pinnipedia is the final common ancestor of *Phoca*, *Otaria*, and *Odobenus*, and all descendants thereof, provided that the ancestor possess flippers synapomorphic with those of *Phoca*, *Otaria*, and *Odobenus*.

Apomorphy/Branch Intersection-Based Clade

Ichthyornis is the initial ancestor of YPM-VP 1450 to possess [a list of 5 apomorphies] synapomorphic with those in YPM-VP 1450 and not also ancestral to *Struthio*, *Tinamus*, or *Vultur*, and all descendants thereof.

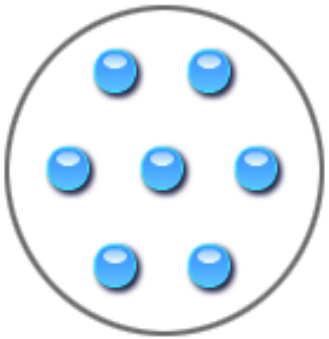
Modelling Phylogeny Mathematically

Taxonomic Unit
Atomic Set

X

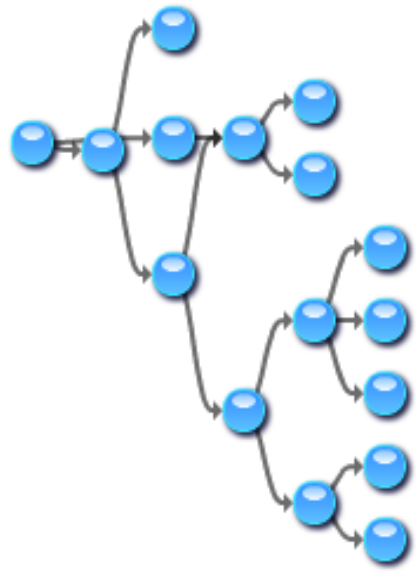
Immediate Descent
Directed Edge

$[X_0, X_1]$



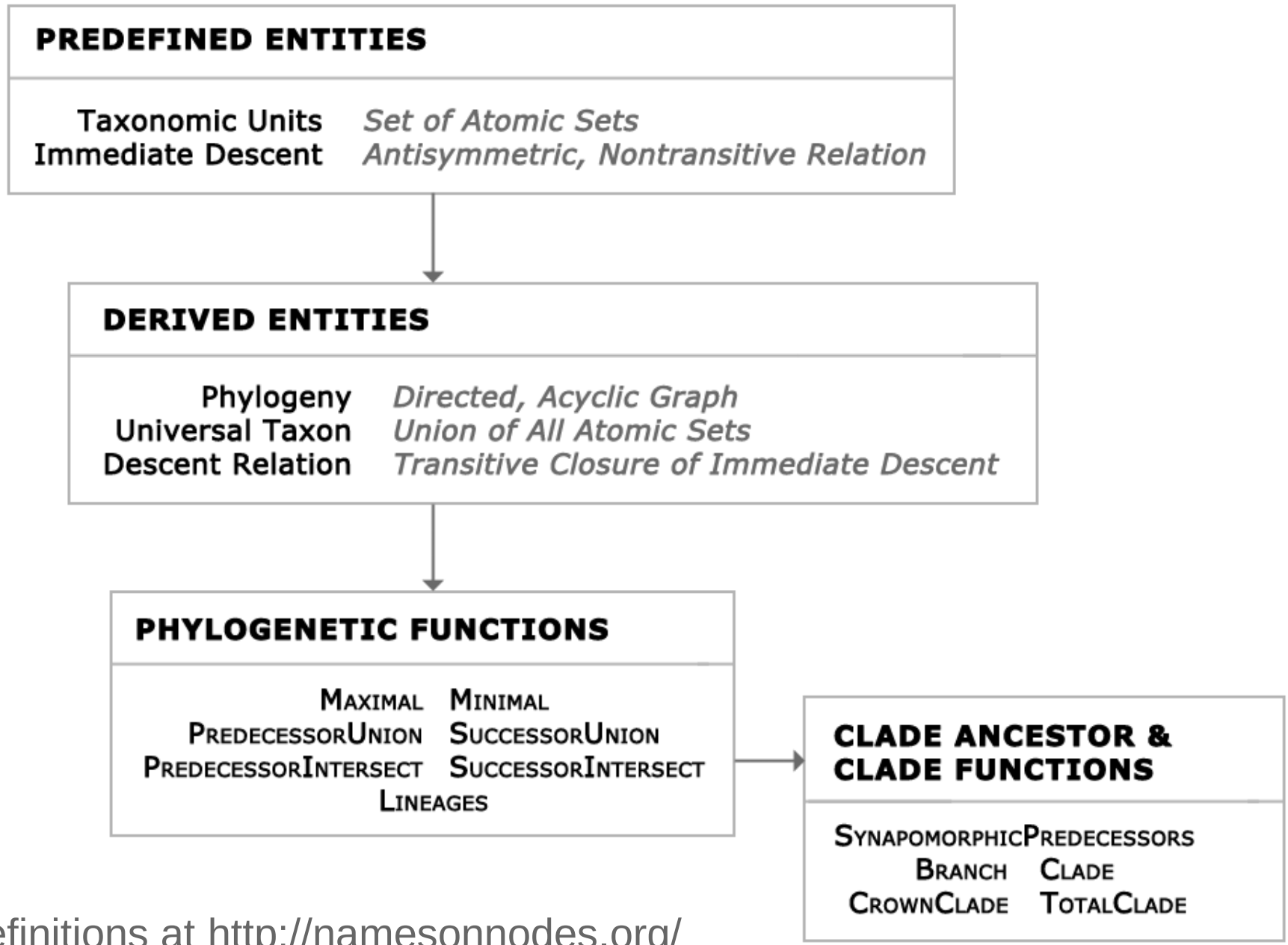
Higher Taxon
Set Union

$X_0 \cup X_1 \cup \ldots X_n$



Phylogeny
Directed, Acyclic Graph

$[\{X_0, X_1, \ldots X_n\}, \{[X_a, X_b], [X_c, X_d], \ldots [X_y, X_z]\}]$



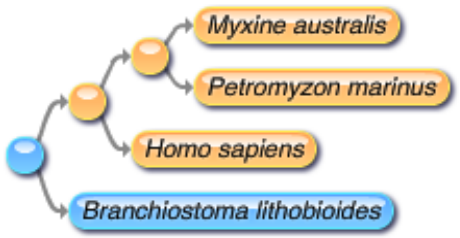
full definitions at http://namesonnodes.org/

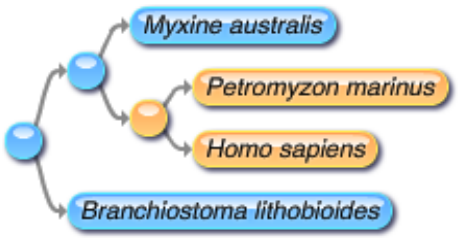
Heterodefinitional Synonymy
(Context-Dependent)

PHYLOGENETIC CONTEXT #1

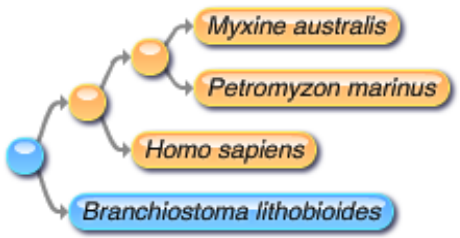
PHYLOGENETIC CONTEXT #2

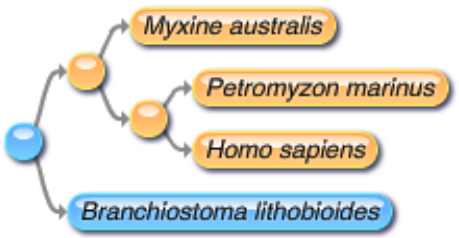
Vertebrata :=
CLADE(***Homo sapiens*** ∪ ***Petromyzon marinus***).





Craniata :=
CLADE(***Homo sapiens*** ∪ ***Petromyzon marinus*** ∪ ***Myxine australis***).





Homodefinitional Synonymy
(Universal)

PHYLOREFERENCE #1

CLADE(***Homo sapiens*** Linnaeus 1758 ∪ ***Lampetra marina*** Malm 1863)

normalize

CANONICAL FORM

CLADE("urn:lsid:ubio.org:namebank:109086" ∪ "urn:lsid:ubio.org:namebank:135116")

normalize

PHYLOREFERENCE #2

(CLADE ∘ ∪)(***Homo sapiens*** Linnaeus 1758, ***Petromyzon marinus*** Linnaeus 1758)

Names on Nodes

web application using
MathML for phyloreferencing

http://namesonnodes.org/